IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s): Bordogna et al.
Case: 13-3-1
Serial No.: 10/643,005
Filing Date: August 18, 2003
Group: 2616
Examiner: Kevin D. Mew

Title: Method and Apparatus for Frequency Offset Control of Ethernet Packets Over a Transport Network

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CORRECED APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Notice of Non-Compliant Appeal Brief, dated January 7, 2009, Appellants submit this Corrected Appeal Brief. The Corrected Appeal Brief is substantively identical to the original Appeal Brief filed May 28, 2008, with the addition of the requested related proceedings appendix. The original Appeal Brief appealed the final rejection dated September 28, 2007, of claims 1-20 of the above-identified patent application.

REAL PARTY IN INTEREST

The present application is assigned to Agere Systems Inc., as evidenced by an assignment recorded on March 19, 2004 in the United States Patent and Trademark Office at Reel 015119, Frame 0237. The assignee, Agere Systems Inc., is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are not related Appeals or Interferences.

STATUS OF CLAIMS

The present application was filed on August 18, 2003 with claims 1 through 20. Claims 1 through 20 are presently pending in the above-identified patent application. Claims 1-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Treadaway et al. (United States Patent No. 7,002,941) in view of Connor (United States Patent No. 7,061,866).

Claims 1, 8, 10 and 12-13 are being appealed.

STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 requires a method for compensating for a frequency offset (page 4, lines 26-28) between an ingress local area network (FIG. 1, 110) and an egress local area network (FIG. 1, 160) communicating over a transport network (FIG. 1, 150), said ingress local area network (FIG. 1, 110) employing an ingress inter-packet gap (FIG. 2, 220) between each packet (FIG. 2, 210) in a packet flow (FIG. 2), said method comprising the steps of: receiving a plurality of packets (FIG. 6, 610) over said transport network (FIG. 1, 150) originating from said ingress local area network (FIG. 1, 110); and providing said plurality of received packets (FIG. 6, 610) to said egress local area network (FIG. 1, 160) with an egress inter-packet gap (FIG. 6, IPG and IPG') between each of said received packets (FIG. 6, 610), wherein a size of said egress inter-packet gap (FIG. 6, IPG and IPG') is decreased to compensate for said frequency offset when said ingress local area network (FIG. 1, 110) is faster than said egress local area network (FIG. 1, 160) and is increased to compensate for said frequency offset when said egress local area network (FIG. 1, 160) is faster than said ingress local area network (FIG. 1, 110; and page 5, lines 5-13).

Independent claim 8 requires a method for compensating for a frequency offset (page 4, lines 26-28) between an ingress local area network (FIG. 1, 110) and an egress local area network (FIG. 1, 160) communicating over a transport network (FIG. 1, 150), said ingress local area network (FIG. 1, 110) employing an ingress inter-paeket gap (FIG. 2, 220) between each packet (FIG. 2, 210) in a packet flow (FIG. 2), said method comprising the steps of: receiving a plurality of packets (FIG. 6, 610) over said transport network (FIG. 1, 150)

originating from said ingress local area network (FIG. 1, 110); and providing said plurality of received packets (FIG. 6, 610) to said egress local area network (FIG. 1, 160) with an egress inter-packet gap (FIG. 6, IPG and IPG') between each of said received packets (FIG. 6, 610), wherein a size of said egress inter-packet gap (FIG. 6, IPG and IPG') is less than a size of said ingress inter-packet gap (FIG. 2, 220) when said ingress local area network (FIG. 1, 110) is faster than said egress local area network (FIG. 1, 160) and is greater than a size of said inter-packet gap (FIG. 2, 220) when said egress local area network (FIG. 1, 160) is faster than said ingress local area network (FIG. 1, 110).

Independent claim 10 requires a method for compensating for a frequency offset (page 4, lines 26-28) between an ingress local area network (FIG. 1, 110) and an egress local area network (FIG. 1, 160) communicating over a transport network (FIG. 1, 150), said ingress local area network (FIG. 1, 110) employing an ingress inter-packet gap (FIG. 2, 220) between each packet (FIG. 2, 210) in a packet flow (FIG. 2), said method comprising the steps of: buffering a plurality of packets received over said transport network originating from said ingress local area network in an egress buffer (FIG. 4, 460 and FIG. 5, 560); monitoring a fill level (FIG. 4, FILL_LVL) of said egress buffer (FIG. 4, 460); and providing said plurality of received packets (FIG. 6, 610) to said egress local area network (FIG. 1, 160) with an egress inter-packet gap (FIG. 6, IPG and IPG') between each of said received packets (FIG. 6, 610), wherein a size of said egress inter-packet gap (FIG. 6, IPG and IPG') is decreased based on said fill level (FIG. 4, FILL_LVL) when said ingress local area network (FIG. 1, 110) is faster than said egress local area network (FIG. 1, 160) and is increased based on said fill level (FIG. 4, FILL_LVL) when said egress local area network (FIG. 1, 160) is faster than said ingress local area network (FIG. 1, 110; and page 5, lines 5-13).

Independent claim 12 requires a method for compensating for a frequency offset (page 4, lines 26-28) between an ingress local area network (FIG. 1, 110) and an egress local area network (FIG. 1, 160) communicating over a transport network (FIG. 1, 150), said ingress local area network (FIG. 1, 110) employing an ingress inter-packet gap (FIG. 2, 220) between each packet (FIG. 2, 210) in a packet flow (FIG. 2), said method comprising the steps of: buffering a plurality of packets received over said transport network originating from said ingress local area network in an egress buffer (FIG. 5, 560); writing said plurality of packets from said first egress buffer (FIG. 5, 560) in a second egress buffer (FIG. 5, 565) at a rate

associated with said transport network together with an inter-packet gap separating each packet (page 9, lines 1-9); and providing said plurality of received packets (FIG. 6, 610) to said egress local area network (FIG. 1, 160) with an egress inter-packet gap (FIG. 6, IPG and IPG') between each of said received packets (FIG. 6, 610), wherein a size of said egress inter-packet gap (FIG. 6, IPG and IPG') is reduced by deleting one or more idle symbols (page 9, lines 16-22) from said inter-packet gap when said ingress local area network (FIG. 1, 110) is faster than said egress local area network (FIG. 1, 160) and is increased by inserting one or more idle symbols in said inter-packet gap when said egress local area network (FIG. 1, 160) is faster than said ingress local area network (FIG. 1, 110; and page 5, lines 5-13).

Independent claim 13 requires an apparatus for compensating for a frequency offset (page 4, lines 26-28) between an ingress local area network (FIG. 1, 110) and an egress local area network (FIG. 1, 160) communicating over a transport network (FIG. 1, 150), said ingress local area network (FIG. 1, 110) employing an ingress inter-packet gap (FIG. 2, 220) between each packet (FIG. 2, 210) in a packet flow (FIG. 2), said apparatus comprising: a port for receiving a plurality of packets (FIG. 6, 610) over said transport network (FIG. 1, 150) originating from said ingress local area network (FIG. 1, 110); and means for providing said plurality of received packets (FIG. 6, 610) to said egress local area network (FIG. 1, 160) with an egress inter-packet gap (FIG. 6, IPG and IPG') between each of said received packets (FIG. 6, 610), wherein a size of said egress inter-packet gap (FIG. 6, IPG and IPG') is decreased to compensate for said frequency offset when said ingress local area network (FIG. 1, 110) is faster than said egress local area network (FIG. 1, 160) and is increased to compensate for said frequency offset when said egress local area network (FIG. 1, 160) is faster than said ingress local area network (FIG. 1, 110; and page 5, lines 5-13).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Independent Claims 1, 8, 10 and 12-13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Treadaway et al. in view of Connor.

ARGUMENT

Independent Claims 1, 8, 10 and 12-13

Independent Claims 1, 8, 10 and 12-13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Treadaway et al. in view of Connor. With regard to claim 1, for example, the Examiner acknowledges that Treadaway does not explicitly show a size of said egress inter-packet gap is decreased to compensate for said frequency offset when said ingress local area network is faster than said egress local area network and is increased to compensate for said frequency offset when said egress local area network is faster than said ingress local area network. The Examiner asserts, however, that Connor teaches a method of dynamically metering packet flow in a packet switched network, which employs decreasing inter-frame spacing IFS or inter-packet gap to increase data rate and increasing inter-frame spacing IFS to decrease data rate (col. 3, lines 9-12, 19-20, and 49-51).

The independent claims emphasize that the size of the egress inter-packet gap is *either* increased or decreased to compensate for a frequency offset. For example, in claim 1, the size of the egress inter-packet gap is decreased when the ingress local area network is faster than the egress local area network **and** is increased to compensate for the frequency offset when the egress local area network is faster than the ingress local area network. In claim 8, the size of the egress inter-packet gap is less than a size of the ingress inter-packet gap when the ingress local area network is faster than the egress local area network **and** is greater than a size of the inter-packet gap when the egress local area network is faster than the ingress local area network.

Likewise, in claim 10, the size of the egress inter-packet gap is decreased based on the fill level when the ingress local area network is faster than the egress local area network **and** is increased based on the fill level when the egress local area network is faster than the ingress local area network.

In claim 12, the size of the egress inter-packet gap is reduced by deleting one or more idle symbols from the inter-packet gap when the ingress local area network is faster than the egress local area network **and** is increased by inserting one or more idle symbols in the inter-packet gap when the egress local area network is faster than the ingress local area network.

Finally, claim 13 emphasizes that the size of the egress inter-packet gap is decreased to compensate for the frequency offset when the ingress local area network is faster

than the egress local area network **and** is increased to compensate for the frequency offset when the egress local area network is faster than the ingress local area network.

In Treadaway, however, a packet retriever adjusts an inter-packet gap for the Fast Ethernet data packets according to an amount of space available in the packet buffer. The size of the inter-packet gap, however is *always decreased*, because by design, the frequency of the second clock signal is lower than the frequency of the first clock signal. See, Col. 4, lines 40-42. Treadaway is adjusting the frequency on the local area network (Fast Ethernet) to match the frequency of the metropolitan radio network. Treadaway assumes that the metropolitan network is always faster than the Fast Ethernet.

The ingress and egress local area networks of the present invention, on the other hand, are operating at similar nominal frequencies subject to a frequency offset within tolerances (see, page 6, lines 8-10, and page 7, line 30, to page 8, line 2). For example, the frequency of the egress local area network 160 may each be, for example, 10 Mbps, 100 Mbps or 1 Gbps (+/- 100 ppm). Thus, the expected worst-case frequency offset in the exemplary embodiment will be 200 ppm. The frequency offset can be in either direction, and the inter-packet gap is adjusted appropriately. *This ability to accommodate positive or negative frequency offsets is not disclosed or suggested by Treadaway.*

As previously indicated, the Examiner has cited Connor for its teaching of a method of dynamically metering packet flow in a packet switched network, which employs decreasing inter-frame spacing IFS or inter-packet gap to increase data rate and increasing inter-frame spacing IFS to decrease data rate (col. 3, lines 9-12, 19-20, and 49-51).

Connor adjusts an inter-packet gap based on a pause command, wherein the pause command is issued based on a fullness threshold of a receiver FIFO located in a remote receiver (col. 1, lines 32-40, and col. 2, lines 33-61). The receiver FIFO may exceed the fullness threshold due to a <u>variety of causes</u> other than a frequency offset, *including heavy loading of a receiver bus* in the <u>*remote*</u> *receiver* (col. 1, lines 58-67). Moreover, in Connor, when the fullness threshold is exceeded, the inter-packet gap of packets *being received by the remote receiver from a transmitter, is <u>increased</u>, thereby decreasing the rate of packets being received by the receiver buffer*. Col. 2, lines 55-59.

In Connor, when the incoming packets arrive too fast (which would overflow the buffer) (col. 1, lines 32-33), the IFS is **increased**. (col. 2, lines 57-58). In the claimed aspect of

the present invention, however, when the fullness threshold is exceeded (ingress is faster than egress), the inter-packet gap of packets *transmitted from the buffer is* <u>*decreased*</u> to compensate for the frequency offset, *thereby increasing the rate of packets leaving the buffer*. Thus, Connor ***teaches away*** from the present invention and *teaches away* from the Treadaway reference. A person of ordinary skill in the art would therefore *not* look to combine Treadaway and Connor.

Thus, even as combined in the manner suggested by the Examiner, Treadaway and Connor *do not teach every element of the independent claims*. Furthermore, based on the KSR considerations discussed below, the combination/modification suggested by the Examiner is not appropriate.

In the Advisory Action, the Examiner challenges whether Connor increases the inter-packet gap of received packets when the fullness threshold is exceeded. The Examiner is again requested to review Connor at Col. 1, lines 34-36 and Col. 2, lines 55-59, where this is explicitly stated (a pause packet is sent when the fullness threshold is exceeded; and the pause packet reduces the transmit rate...the transmit rate may be decreased by increasing the IFS).

In the Advisory Action, the Examiner emphasizes the teachings at col. 3, lines 9-12, 19-20, and 49-51. The teachings at col. 3, lines 9-12 are directed to increasing the IFS in response to a received pause. As indicated above, this will serve to reduce the transmission rate upon the fullness threshold being exceeded.

The teachings at col. 3, lines 19-20 and 49-51, however, are directed to a retraining algorithm that retrains the transmission rate to return the transmission rate towards the minimum IFS (by increasing the transmission rate). As noted at col. 3, lines 27-28, this retraining algorithm is performed **if** no additional pause frames are received (which will again trigger the process of FIG. 2, at step 210). In addition, as shown in FIG. 3, and discussed at col. 3, lines 29-34, the process of FIG. 3 is initiated only upon the occurrence of a certain "event," such as a waiting period.

Again, when the incoming packets arrive too fast (col. 1, lines 32-33), the IFS in Connor is **increased**. (col. 2, lines 57-58). The IFS is only decreased periodically *during retraining* **if** no additional pause frames are received (which would again trigger the process of FIG. 2, at step 210). *Thus, Appellants submit that Connor only works for frequency offset in one direction (increasing IFS), with the other direction (decreasing IFS) merely ensuring that the system stays within the operable range of the system.*

Thus, while the process of FIG. 3 may decrease the IFS at step 340, it does **not** decrease the IFS:

(i) to *compensate **for** said frequency offset **when*** said ingress local area network is *faster* than said egress local area network, as required by independent claim 1;

(ii) ***when*** said ingress local area network is *faster* than said egress local area network, as required by claim 8;

(iii) ***based on*** said *fill level* ***when*** said ingress local area network is *faster* than said egress local area network, as required by claim 10;

(iv) ***by*** deleting one or more idle symbols from said inter-packet gap when said ingress local area network is *faster* than said egress local area network, as required by claim 10; and

(v) to *compensate **for** said frequency offset **when*** said ingress local area network is *faster* than said egress local area network, as required by independent claim 13.

<u>*KSR* Considerations</u>

An Examiner must establish "an apparent reason to combine … known elements." *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). Here, the Examiner merely states that the motivation "is to match the egress data rate to the link partner's ingress processing rate."

Applicants are claiming a new technique for compensating for a frequency offset between an ingress local area network and an egress local area network.

There is *no* suggestion in Treadaway and Connor, alone or in combination, to compensate for a frequency offset by *either <u>increasing</u> or <u>decreasing</u>* an inter-packet gap of packets. In fact, as noted above, Treadaway and Connor only teach one direction and Connor *teaches away* from the Treadaway invention.

The *KSR* Court discussed in some detail United States v. Adams, 383 U.S. 39 (1966), stating in part that in that case, "[t]he Court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." (KSR Opinion at p. 12). Thus, there is no reason to make the asserted combination/modification.

Thus, Treadaway and Connor, alone or in combination, do not disclose or suggest increasing and decreasing the size of the egress inter-packet gap to compensate for a frequency offset, as variously required by each independent claim (as outlined above).

Applicants respectfully request the withdrawal of the rejections of independent claims 1, 8, 10, 12 and 13.

Dependent Claims

Claims 2-7, 9, 11 and 14-20 are dependent on independent claims 1, 8, 10 and 13, respectively, and are therefore patentably distinguished over Treadaway and Connor, alone or in combination, because of their dependency from independent claims 1, 8, 10 and 13 for the reasons set forth above, as well as other elements these claims add in combination to their base claim.

Conclusion

All of the pending claims, i.e., claims 1-20, are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner or the Appeal Board has any further suggestions for expediting allowance of this application, the Examiner or the Appeal Board is invited to contact the undersigned at the telephone number indicated below.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully submitted,

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Date: February 9, 2009

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APPENDIX

1. A method for compensating for a frequency offset between an ingress local area network and an egress local area network communicating over a transport network, said ingress local area network employing an ingress inter-packet gap between each packet in a packet flow, said method comprising the steps of:

receiving a plurality of packets over said transport network originating from said ingress local area network; and

providing said plurality of received packets to said egress local area network with an egress inter-packet gap between each of said received packets, wherein a size of said egress inter-packet gap is decreased to compensate for said frequency offset when said ingress local area network is faster than said egress local area network and is increased to compensate for said frequency offset when said egress local area network is faster than said ingress local area network.

2. The method of claim 1, wherein a frequency of said ingress local area network exceeds a frequency of said egress local area network and said providing step further comprises the step of reducing said size of said egress inter-packet gap.

3. The method of claim 1, wherein a frequency of said egress local area network exceeds a frequency of said ingress local area network and said providing step further comprises the step of increasing said size of said egress inter-packet gap.

4. The method of claim 1, wherein said size of said egress inter-packet gap is statically configured based on said frequency offset.

5. The method of claim 1, wherein said size of said egress inter-packet gap is dynamically adjusted based on a fill level of a buffer associated with an egress port of said transport network.

6. The method of claim 1, wherein said size of said egress inter-packet gap is dynamically adjusted to prevent a buffer associated with an egress port of said transport network from overflowing.

7. The method of claim 1, wherein said size of said egress inter-packet gap is reduced by deleting idle symbols from an extended inter-packet gap.

8. A method for compensating for a frequency offset between an ingress local area network and an egress local area network communicating over a transport network, said ingress local area network employing an ingress inter-packet gap between each packet in a packet flow, said method comprising the steps of:

receiving a plurality of packets over said transport network originating from said ingress local area network; and

providing said plurality of received packets to said egress local area network with an egress inter-packet gap between each of said received packets, wherein a size of said egress inter-packet gap is less than a size of said ingress inter-packet gap when said ingress local area network is faster than said egress local area network and is greater than a size of said inter-packet gap when said egress local area network is faster than said ingress local area network.

9. The method of claim 8, wherein said size of said egress inter-packet gap is statically configured based on an expected frequency offset.

10. A method for compensating for a frequency offset between an ingress local area network and an egress local area network communicating over a transport network, said ingress local area network employing an ingress inter-packet gap between each packet in a packet flow, said method comprising the steps of:

buffering a plurality of packets received over said transport network originating from said ingress local area network in an egress buffer;

monitoring a fill level of said egress buffer; and

providing said plurality of received packets to said egress local area network with an egress inter-packet gap between each of said received packets, wherein a size of said egress

inter-packet gap is decreased based on said fill level when said ingress local area network is faster than said egress local area network and is increased based on said fill level when said egress local area network is faster than said ingress local area network.

11. The method of claim 10, wherein said size of said egress inter-packet gap is adjusted to prevent said egress buffer from overflowing.

12. A method for compensating for a frequency offset between an ingress local area network and an egress local area network communicating over a transport network, said ingress local area network employing an ingress inter-packet gap between each packet in a packet flow, said method comprising the steps of:

buffering a plurality of packets received over said transport network originating from said ingress local area network in a first egress buffer;

writing said plurality of packets from said first egress buffer in a second egress buffer at a rate associated with said transport network together with an inter-packet gap separating each packet; and

providing said plurality of received packets to said egress local area network with an egress inter-packet gap between each of said received packets, wherein a size of said egress inter-packet gap is reduced by deleting one or more idle symbols from said inter-packet gap when said ingress local area network is faster than said egress local area network and is increased by inserting one or more idle symbols in said inter-packet gap when said egress local area network is faster than said ingress local area network.

13. An apparatus for compensating for a frequency offset between an ingress local area network and an egress local area network communicating over a transport network, said ingress local area network employing an ingress inter-packet gap between each packet in a packet flow, said apparatus comprising:

a port for receiving a plurality of packets over said transport network originating from said ingress local area network; and

means for providing said plurality of received packets to said egress local area network with an egress inter-packet gap between each of said received packets, wherein a size of

said egress inter-packet gap is decreased to compensate for said frequency offset when said ingress local area network is faster than said egress local area network and is increased to compensate for said frequency offset when said egress local area network is faster than said ingress local area network.

14. The apparatus of claim 13, wherein a frequency of said ingress local area network exceeds a frequency of said egress local area network and said means for providing further comprises means for reducing said size of said egress inter-packet gap.

15. The apparatus of claim 13, wherein a frequency of said egress local area network exceeds a frequency of said ingress local area network and wherein means for providing further comprises means for increasing said size of said egress inter-packet gap.

16. The apparatus of claim 13, wherein said size of said egress inter-packet gap is statically configured based on said frequency offset.

17. The apparatus of claim 13, wherein said size of said egress inter-packet gap is dynamically adjusted based on a fill level of a buffer associated with an egress port of said transport network.

18. The apparatus of claim 13, wherein said size of said egress inter-packet gap is dynamically adjusted to prevent a buffer associated with an egress port of said transport network from overflowing.

19. The apparatus of claim 13, wherein said egress inter-packet gap is inserted by provider equipment between said transport network and said egress local area network.

20. The apparatus of claim 13, wherein said size of said egress inter-packet gap is reduced by deleting idle symbols from an extended inter-packet gap.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.